

PALEONTOLOGY.—*Ostracoda from the Devonian (Onondaga) chert of west Tennessee.*¹ R. S. BASSLER, U. S. National Museum.

In the vicinity of Camden, Benton County, Tenn., along the line of the N. C. & St. L. Railroad, are large quarries exposing the Devonian formation that J. M. Safford and Charles Schuchert in 1899² described as the Camden chert of Lower Oriskany age, judging from the macrofossils. Then, as outlined in Miss Wilmarth's *Lexicon of Geologic Names of the United States*,³ Professor Dunbar in 1918⁴ restricted the term Camden chert to the upper 200 feet of the original formation, which he determined as of Onondaga age, and subdivided the lower part into the Harriman chert (0–55 feet thick) underlain by the Quall limestone (0–10 feet thick), both of Oriskany age, and at the base, the Decaturville chert (0–6 feet thick) of Helderbergian age. The ostracod fauna here described from the true Camden chert is of special interest for the beauty of the specimens and the unusual way in which they have been preserved. Only the strongly marked species are here described; the smooth forms remain for some future work.

The cherty beds of the Camden as well as most other chert formations were originally limestones that during long weathering had been replaced by silica. In the resulting cherts the fossils are usually represented by molds or by an internal cast separated by a space from the wall of the mold. The porous cherts of the Camden formation afford excellent gutta-percha squeezes not only of the larger fossils but also of such microscopic ones, as the Ostracoda. In addition, quite perfect free silicified Ostracoda may be found by washing the white clays resulting from the final decomposition of these cherts. Such specimens reproduce the original ostracod shells with exact fidelity, although they are in reality siliceous pseudomorphs formed as a result of several replacements. First, the original calcareo-chitinous shells are replaced by lime; next by silica, when the enclosing limestone is changed to chert; then the silicified fossils are leached out leaving molds that later are filled by another infiltration of a different form of silica; and finally, the silicified limestone is reduced by weathering to a white clay, a form of tripoli, leaving the fossils, now siliceous pseudomorphs for the second time, unchanged.

More study is necessary upon the various Early Devonian ostracod

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² Amer. Journ. Sci. (4) 7: 429–430. 1899.

³ U. S. Geol. Surv. Bull. 896. 1938.

⁴ Amer. Journ. Sci. (4) 46: 732–755. 1918.

faunas, but the present assemblage seems to be related to that from the Lower Oriskany Shriver chert of Maryland and Pennsylvania and the Onondaga of the same States. A small sample of the Clear Creek chert from the vicinity of Jonesboro, Ill., shows good casts of many of the species herein described from west Tennessee, so that there appears to be no doubt of the equivalence of these two formations.

The following descriptions have been much abbreviated not only to save space but also because the author believes that the long discussions of Paleozoic Ostracoda so often printed are more confusing than helpful and that an accurate photographic figure clearly showing the characters combined with a few remarks as to the specific features is sufficient for most purposes. All the specimens illustrated on the plate are from clay beds resulting from the decomposition of chert layers near base of the Camden formation at the quarry half a mile south of Camden, Tenn. Collections at this point were made by Professor Schuchert for the National Museum many years ago, then by the writer later, and finally in more abundance by Dr. G. A. Cooper and R. D. Mesler in recent years. The types are the property of the U. S. National Museum. Measurements are omitted throughout this article because they can be easily determined from the illustrations.

DESCRIPTIONS OF GENERA AND SPECIES

Paraparchites mesleri n. sp. (Leperditellidae Ulrich and Bassler) Fig. 1

Carapace similar to *P. subrotunda* Ulrich from the Onondaga (Jeffersonville) limestone of the Falls of the Ohio, but differing in that the ends of the valves are almost equally rounded. The specimen figured by Kindle in 1912 from the Onondaga of Little Moccasin Gap, W. Va., as *Leperditia subrotunda* Ulrich, has the ends similarly rounded and in spite of its imperfect preservation should probably be referred to this new species.

Halliella pulchra n. sp. (Primitiidae Ulrich and Bassler) Fig. 2

Although related to the genotype *H. retifera* Ulrich from the Onondaga (Jeffersonville) limestone at the Falls of the Ohio, this beautiful new species may be distinguished by its equally ended, more evenly elevated, coarsely reticulated valves, with a thin crestlike border around the free edges and a slightly curved carina above the hinge line. A faint median sulcus terminates in a small, deep, almost central pit.

Parabolbina loculosa n. sp. (Hollinidae Swartz) Fig. 3

Similar to *P. limbatus* Swartz, 1932, from the Oriskany (Shriver) chert of Pennsylvania, but differing in the more prominent well-rounded node on each side of the dorsal median sulcus, in the long narrow anterior spine, and the frill along the posterior half of the ventral margin composed of four folds forming well-marked loculi.

Ctenoloculina n. gen. (Tetradellidae Swartz)

Tetradella-like shells with valves crossed transversely by four flat-topped,

finely reticulated ridges separated by narrow furrows and with the free margins surrounded by a false border, which in the female is swollen to form 4 to 6 loculi or brood chambers. Right valve grooved on free margin to receive edge of the left.

Genotype.—*Tetradella cicatricosa* Warthin, 1934. Hamilton of Michigan, Ontario, etc.

***Ctenoloculina cristata* n. sp.**

Fig. 4

In this new species the four reticulated ridges are not as regularly arranged as in the genotype, the posterior one being crossed by a furrow dividing it into two; the next one being irregularly triangular in outline; and the third and fourth, the two anterior ones, being separated only by a sharp crestlike line. This crest is joined by one bounding the anterior ridge and proceeds posteriorly along the free margin above the true edge of the valve. In the female form three loculi are found in the posterior half between this crest and the true margin.

***Bollia ungulata* n. sp. (Drepanellidae Swartz)**

Fig. 5

Like *B. unguia* Jones but differing in the shorter, higher valves with a more pronounced bulb occupying the anterior limb of the inner ridge.

***Bollia tribolbina* n. sp.**

Figs. 6, 7

Characterized by its small, elongate carapace with narrow uniformly developed outer ridge closely following the entire free margin, and a sharply angulated inner ridge composed of a bulbous anterior part and narrower ventral and posterior portions, each ending in a slight expansion.

***Bollia obesoides* n. sp.**

Figs. 8, 9

Similar to *B. obesa* Ulrich from the Onondaga (Jeffersonville) limestone of the Falls of the Ohio, but differing in the more developed and rounded marginal ridge and the minute spines along both ridges but particularly along the ventral edge.

***Bollia burgeneri* Swartz, 1932**

Fig. 10

This species, which is quite similar to *B. sagittaformis* Swartz, 1932, differs in that the posterior limb of the inner ridge is quite enlarged to form a somewhat rounded, flattened knob. The Tennessee specimens vary from the typical Shriver chert Pennsylvania form in the greater thickness of the posterior limb, a character apparently not of varietal importance.

***Bollia sagittaformis* Swartz, 1932**

Fig. 11

The large size, the well-rounded and uniformly developed outer ridge, the equally obtuse cardinal angles, the U-shaped inner ridge with triangular harpoon-like knob forming the anterior portion, and the narrow posterior limb, characterize this fine species, which is one of the commonest ostracods in this fauna.

***Ulrichia crassimuralis* n. sp. (Drepanellidae Swartz)**

Fig. 12

Although much like the genotype *U. conradi* Jones, from the Hamilton at Theford, Ontario, in outline, minute punctation, and arrangement of the nodes, this species is readily distinguished by its well-developed, more pronounced marginal ridge.

Aechmina longior n. sp. (Aechminidae Swartz)

Fig. 13

Very similar to *A. cuspidata* Jones from the Wenlock of England, but the dorsal spine is relatively longer and narrower and the free edges of the valves are furnished with very delicate spicules.

Aechmina equilateralis n. sp.

Fig. 14

Although quite similar to several species of this genus, this one is distinguished by the short blunt spine arising from about the middle of the upper edge of the valve which in addition is equal ended and bears minute spines along its ventral edge.

Amphissites ulrichi n. sp. (Kirkbyidae Ulrich and Bassler) Fig. 15

Although obviously related to *A. subquadrata* Ulrich of the Onondaga (Jeffersonville) limestone at the Falls of the Ohio, etc., the marginal free edge in this new species is distinctly raised but the coarse reticulation continues to the border of the valve. Moreover, the dorsal angles are more obtuse and equal, the carapace is larger, and the surface markings are coarser.

Amphissites lunatus n. sp.

Fig. 16

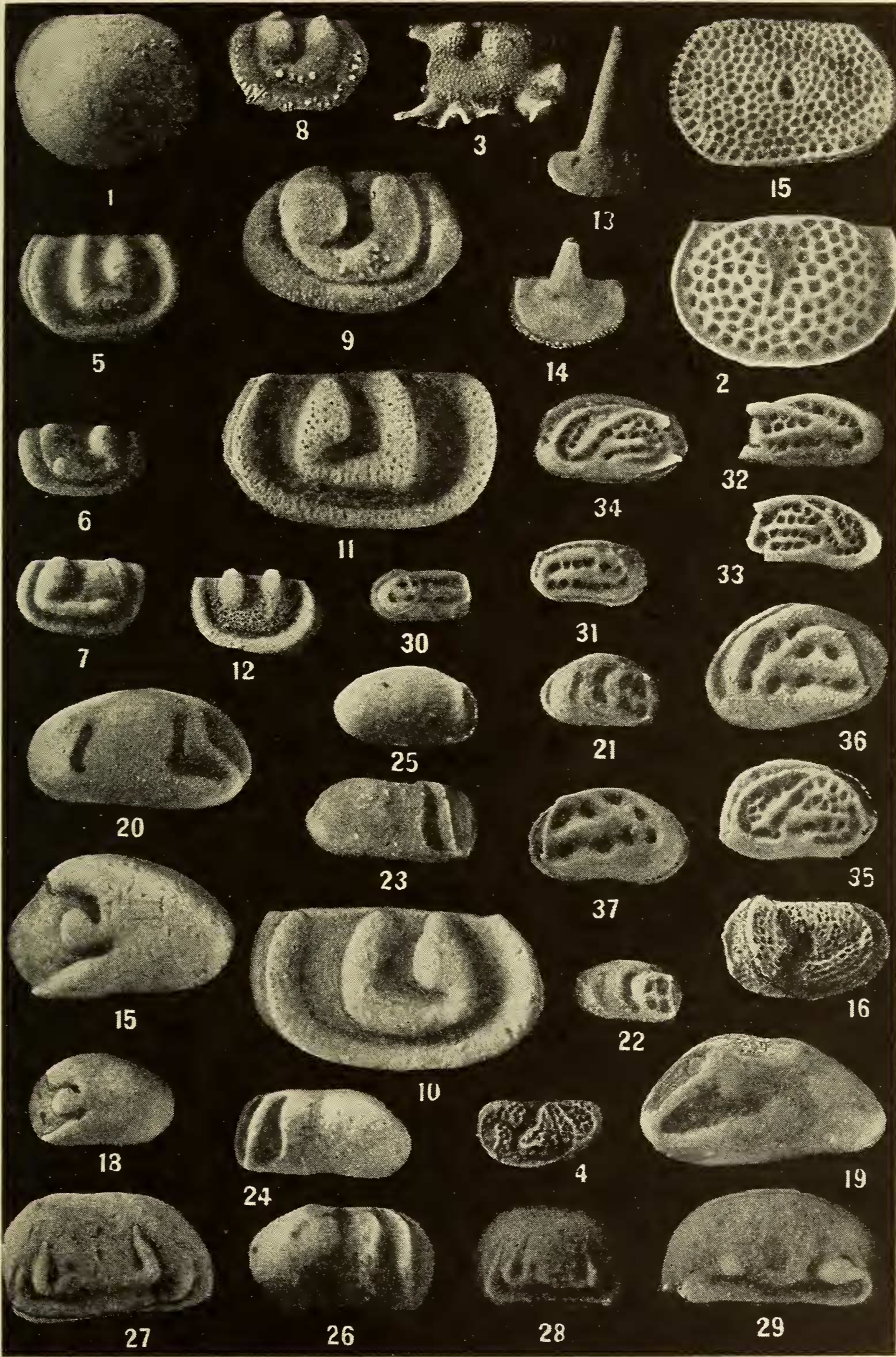
This beautiful species is readily recognized by the broad, crescentic, elevated band crossing the carapace parallel but at some distance from the ventral edge, covered with scalelike reticulations. A well-developed central pit occurs just above this band, and the entire surface in general is marked by finely reticulate ornamentation. Rising just above the free margins of the valve is a sharp linear crest.

Thlipsura furcoides n. sp. (Thlipsuridae Jones) Figs. 17, 18

This fine, abundant species differs from *T. furca* Roth of the Helderbergian

Illustrations $\times 20$ of Camden chert (Onondaga) Ostracoda from Camden, Tenn. The catalog numbers are those of the U. S. National Museum.

Fig. 1.—*Paraparchites mesleri* n. sp. (holotype, right valve probably, No. 101021). Fig. 2.—*Hallliella pulchra* n. sp. (holotype, right valve, No. 101022). Fig. 3.—*Parabolbina loculosa* n. sp. (holotype, imperfect left valve, No. 101023). Fig. 4.—*Ctenoloculina cristata* n. gen. and sp. (holotype, male, right valve, No. 101024). Fig. 5.—*Bollia ungulata* n. sp. (holotype, right valve, No. 101025). Figs. 6, 7.—*Bollia tribolbina* n. sp. (cotypes, right and left valves, No. 101026). Figs. 8, 9.—*Bollia obesoides* n. sp. (cotypes, two left valves, No. 101027). Fig. 10.—*Bollia burgeneri* Swartz, 1932 (plesiotype, right valve, No. 101028). Fig. 11.—*Bollia sagittaformis* Swartz, 1932 (plesiotype, left valve, No. 101029). Fig. 12.—*Ulrichia crassimuralis* n. sp. (holotype, right valve, No. 101030). Fig. 13.—*Aechmina longior* n. sp. (holotype, left valve, No. 101031). Fig. 14.—*Aechmina equilateralis* n. sp. (holotype, right valve, No. 101032). Fig. 15.—*Amphissites ulrichi* n. sp. (holotype, right valve, No. 101033). Fig. 16.—*Amphissites lunatus* n. sp. (holotype, right valve, No. 101034). Figs. 17, 18.—*Thlipsura furcoides* n. sp. (cotypes, left valves of a mature and a young specimen, No. 101035). Fig. 19.—*Thlipsurella laevis* n. sp. (holotype, left valve, No. 101036). Fig. 20.—*Thlipsurella cooperi* n. sp. (holotype, right valve, No. 101037). Figs. 21, 22.—*Thlipsurella secoclepta* Swartz, 1932 (plesiotypes, two right valves, No. 101038). Figs. 23, 24.—*Thlipsurina elongata* n. gen. and sp. (cotypes, right and left valves, No. 101039). Fig. 25.—*Thlipsurina simplex* n. sp. (holotype, right valve, No. 101040). Fig. 26.—*Thlipsurina similis* n. sp. (holotype, right valve, No. 101041). Figs. 27, 28.—*Ranapeltis typicalis* n. gen. and sp. (cotypes, right valves of a mature and a young specimen, No. 101042). Fig. 29.—*Ranapeltis unicarinata* n. sp. (holotype, left valve, No. 101043). Figs. 30, 31.—*Octonariella clavatulata* n. sp. (cotypes, left valves, No. 101044). Figs. 32, 33.—*Octonariella bifurcata* n. sp. (cotypes, right valves, No. 101045). Figs. 34, 35.—*Octonariella bispinosa* n. sp. (cotypes, left valves, the latter slightly broken, No. 101046). Figs. 36, 37.—*Octonariella typica* n. gen. and sp. (cotypes, left and right valves, No. 101047).



Figs. 1-37.—(See opposite page for explanation.)

(Haragan marl) of Oklahoma in its more robust elongate carapace, flatter valves, its shorter and more bulbous median ridge, and its sharper, more projecting ventral protuberance.

***Thlipsurella laevis* n. sp.** (Thlipsuridae Jones) Fig. 19

Valves reniform in outline with narrow posterior end. Surface gently rounded with a flat margin along dorsal two-thirds of anterior end bounded by a sharply elevated, narrow, diagonally direct ridge behind which is a broad furrow irregularly triangular in outline extending to the middle of the valve along the midlength. Right and left valves with similar surface markings.

***Thlipsurella cooperi* n. sp.** Fig. 20

Valves elongate oval, with gently rounded surface marked at the posterior end by a slightly curved sulcus and at the anterior end by a flattened margin along the dorsal two-thirds bounded by a curved ridge, which in turn is succeeded by a narrow, somewhat triangular furrow.

***Thlipsurella secoclella* Swartz, 1932** Figs. 21, 22

The Tennessee specimens here figured agree with the Pennsylvania Shriver chert types in all respects except that the submedian cleft is better developed and the two pits behind it are often united.

***Thlipsurina* n. gen.** (Thlipsuridae Jones)

Similar to *Thlipsura* in general shell characters but differing in the absence of a posterior sulcus and in the presence of a broad, shallow, transverse, median depression and of a flattened anterior end bounded by a sharp ridge which in turn is followed typically by a broad, deep, curved sulcus expanding in width from the hinge line to the ventral margin. Surface markings alike on both valves.

Genotype.—*T. elongata* new species.

***Thlipsurina elongata* n. sp.** Figs. 23, 24

The elongate carapace, the flattened anterior marginal area succeeded posteriorly by a well-developed sulcus increasing in width toward the ventral edge, and the broad median transverse shallow depression, characterize this new species.

***Thlipsurina simplex* n. sp.** Fig. 25

Similar to *T. (Thlipsura) primitiva* (Roth) from the Helderbergian (Haragan) of Oklahoma, but differing in the oval instead of wedge shape of the valves and the narrow, flattened anterior border.

***Thlipsurina similis* n. sp.** Fig. 26

Similar to the genotype but differing in the less elongate, higher carapace with the central depression better developed. Both sides of the carapace are known and are similar to each other.

***Ranapeltis* n. gen.** (Thlipsuridae Jones)

Hinge, without overlap, but right valve seems slightly to overlap left along the ventral margin. Valves subtrapezoidal to subreniform marked in the type species by two narrow ridges developed parallel to the ventral margin and turning upward at an acute angle towards the dorsal edge and in the second species by only a single ridge. A large eye spot or muscle scar is centrally located within the inner ridge and the free edge of valves bears a spine at the angular anterior end.

Genotype.—*R. typicalis* new species.

Ranapeltis typicalis n. sp.

Figs. 27, 28

The two parallel ridges bent abruptly toward the dorsal but reaching only about half the distance, the muscle spot, and the angular anterior ventral margin with its pointed spine, are characters that make this ostracod easy to identify.

Ranapeltis unicarinata n. sp.

Fig. 29

Although similar in general features to the genotype, this species has but a single ventral ridge, which, however, in turning toward the dorsal margin bends abruptly toward the center, each end terminating in a decided bulb, with the strongly marked muscle impression midway between them. The anteroventral spine is as well marked as in the type species.

Octonariella n. gen. (Thlipsuridae Jones)

Inequivalved shells with the larger left valve overlapping the right on the free edges, the surface pattern of opposite valves sometimes different and the typical U-shaped annular ridge of *Octonaria* replaced by a single ridge in the anterior half and a bifurcated ridge posteriorly, the latter terminating in two prominent spines one at each end of a sharp transverse connecting bar. Spaces between ridges marked by a series of pitlike depressions.

Genotype.—*O. typica* new species.

Octonariella clavatula n. sp.

Figs. 30, 31

Anterior and posterior ridges so joined that valve appears traversed lengthwise by three parallel elevations, the outer two united at the anterior end and terminating in a bar with spines at the posterior. Two rows of pits developed between the three elevated areas. Although related to *O. (Octonaria) clavigera* (Ulrich) of the Onondaga at the Falls of the Ohio, the central ridge in the present species does not stand out like a club.

Octonariella bifurcata n. sp.

Figs. 32, 33

This well-marked ostracod may be recognized by its narrow elongate form and very prominent posterior spines. In the distribution of the ridges and depressions it resembles *O. bispinosa* a broader species of which it might be considered the opposite valve. This is not the case, however, since both right and left valves with the characters here figured are known.

Octonariella bispinosa n. sp.

Figs. 34, 35

Both valves of this common species are known and differ little from each other. The characteristic features are the shorter, higher form of the valve and the consequent increase in the number of depressions between the ridges, which as usual end in two well-marked spines.

Octonariella typica n. sp.

Figs. 36, 37

This very abundant ostracod is represented by both valves and complete examples leaving no doubt that the two somewhat different aspects figured represent the same species. The smaller (right valve lacking the broad overlapping border of the left bears a row of large coarse pits next to the anterior free margin and two rows of two and of three pits, respectively, parallel to the ventral margin. The latter rows are joined by a crest at each end of which is a small sharp spine. The larger overlapping valve has the same general arrangement of pits but broad posterior and anterior borders distinguish it.